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(71) Applicant *(for all designated States except US)*: ES ENERGY TECHNOLOGIES, L.L.C. [US/US]; 6097 E. Grant Road, Tucson, AZ 85712 (US).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: DECKER, Randall, K. [US/US]; 1220 E. Barbary Coast Road, Tucson, AZ 85749 (US).

(74) Agent: PFLEGER, Edmund, P.; Hayes, Soloway, Hennessey, Grossman & Hage, P.C., 130 W. Cushing Street, Tucson, AZ 85701 (US).

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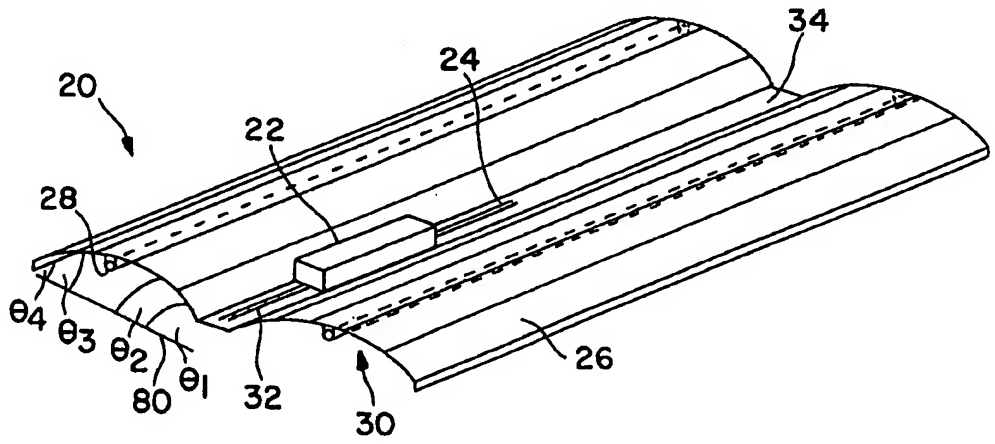

(57) Abstract

A light fixture retrofit system to permit a user to quickly retrofit existing lighting fixtures with a more efficient and cost–effective fixture, without requiring the services of an electrical contractor. In one embodiment, a one–piece retrofit unit is provided that includes a reflector, sockets and ballast. In another embodiment, a two–piece retrofit unit is provided that includes a reflector piece and a centerpiece, having sockets and ballast affixed to the centerpiece. The reflector is formed with reflecting surfaces to optimally direct light in a downward direction. The present invention obviates the need for costly disposal of conventional ballasts by providing a fixture unit that can be placed directly over an existing ballast.

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LIGHT FIXTURE RETROFIT SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a light fixture retrofit system. More particularly, the present invention relates to a self-contained retrofit unit that can be used to retrofit standard fluorescent lay-in light fixtures containing electromagnetic ballasts and T12 lamps with a more energy efficient electronic ballast, higher output T5 lamps, and an optimally designed reflector.

2. Description of Related Art

Referring to Figure 1, a conventional fluorescent light fixture 10 is depicted. The conventional fixture 10 typically includes one or more lamps 12, and sockets 14 affixed to the housing 16. A socket 14 is disposed at either end of each lamp 12 to hold the lamp within the housing, and to supply power to the lamp. A ballast 18 is provided to transform ordinary AC power to an appropriate voltage and/or current for a given lamp. Conventional ballasts 18 include electromagnetic coil-type transformers, although solid state ballasts have emerged which are more efficient than the electromagnetic ballast. In the U.S., the majority of installations for fixtures of this type are older T12 lamp specification. The fixture disclosed in Figure 1 is a typical lay-in design that is used in hanging ceilings, etc., and come in a variety of standard dimensions including 2x2, 1x4, 2x4, or may be specially dimensioned for a particular area.

For the past ten years in the United States the T8 lamp, a more efficient replacement for the T12 lamp, in combination with an electronic ballast has been commercially available in new fixtures and as components for retrofitting older fixtures. However, changing out the old ballast, wiring and sockets requires the fixture to be disassembled and reassembled, a very labor-intensive process. Moreover, disposal of old electromagnetic ballasts are subject to strict EPA guidelines because most qualify as hazardous waste, requiring costly removal and disposal. Thus, the task of retrofitting these types of light fixtures with T8 lamps and electronic ballasts has been performed for the most part by electrical contractors. Recently an even more efficient lamp was invented, the T5 lamp. The T5 lamp is currently used mostly in Europe, is more energy efficient than both the T8 lamp and

T12 lamp, and is capable of producing about 27% more light than T8 lamps in enclosed fixtures. Thus, the T5 lamp is an attractive alternative to the currently popular T8 lamp as a retrofitting component. However, retrofitters are reluctant to switch over to the T5 lamp because, among other things, the T5 is a metric specification where the overall length of the unit is approximately two inches shorter than T8's and T12's. Thus, in order to utilize a T5 lamp to retrofit a standard fixture in the conventional manner would be difficult and costly and has not been a commercially acceptable alternative.

Summary of the Invention

Accordingly, the present invention provides a light fixture retrofit system. In one embodiment, the present invention provides a self-contained retrofit unit that can be used to retrofit standard fluorescent lay-in light fixtures containing electromagnetic ballasts and T12 lamps with a more energy efficient electronic ballast, higher output T5 lamps, and an optimally designed reflector. The combination enables the use of two T5 lamps versus four T12 lamps to obtain the same light output. The design allows the shorter T5 lamps to fit inside the existing fixture without the necessity of removing existing components or separately installing new components, thus eliminating the need for the involvement of an electrical contractor, or the costly fees associated with disposing the electromagnetic ballasts. In the first embodiment, the present invention provides a retrofit unit that contains a ballast mounted to a reflector, and sockets mounted to the reflector that provide T5 fluorescent lamp compatibility. The installation method of the first embodiment includes mounting the retrofit unit that includes placing the unit over the existing ballast (inside the existing fixture), and connecting the power leads associated with ballast to existing power available.

In another embodiment, a separate reflector and centerpiece are provided. The reflector is mounted into the troffer body of an existing light fixture (with the existing T12 bulbs removed). The reflector contains openings or holes therein to accommodate the existing ballast. Once the reflector is installed, a centerpiece can be mounted onto the reflector. The centerpiece includes a new ballast for T5 lamps, and lamp sockets to accommodate T5 bulbs. In this embodiment, since no components are mounted directly on the reflector, a thinner gauge of material is permissible, according to UL requirements.

In both embodiments, the reflector piece is preferably adapted to have a generally semi-circular profile with a plurality of longitudinally arranged reflecting surfaces at varying locations throughout the profile. Each reflecting surface is preferably formed to angle the light (from a bulb) in a downward direction generally perpendicular to a horizontal plane.

Advantageously, the light fixture retrofit system of the present invention permits a user to quickly retrofit existing lighting fixtures with a more efficient and cost-effective fixture, without requiring the services of an electrical contractor. Also advantageously, the present invention obviates the need for costly disposal of conventional ballasts by providing a fixture unit that can be placed directly over an existing ballast. The present invention also provides significant man-hour savings needed to retrofit existing fixture technology.

It will be appreciated by those skilled in the art that although the following Detailed Description will proceed with reference being made to preferred embodiments, the present invention is not intended to be limited to these preferred embodiments. Other features and advantages of the present invention will become apparent as the following Detailed Description proceeds, and upon reference to the Drawings, wherein like numerals depict like parts, and wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an edge-on view of a conventional fluorescent light fixture;

Figure 2 is an isometric view of the retrofit unit of the first embodiment of the present invention;

Figures 3A-3C are edge-on views of the retrofit unit of the second embodiment of the present invention;

Figure 4 is a top-down view of the centerpiece of the retrofit unit of Figures 3A-3C; and

Figure 5 is a top-down view of the reflector of the retrofit unit of Figures 3A-3C.

Detailed Description of the Invention

Figure 2 depicts one embodiment of the retrofit unit 20 of the present invention. Essentially, this embodiment provides a one-piece retrofit unit designed to accommodate T5 bulbs, as described below. Preferably, the retrofit unit 20 includes a

ballast 22, a reflector 26 and sockets 28. Also preferably, the reflector 26 is formed of aluminum having specular surface features, and formed having parabolic indents 30 to house a fluorescent lamp. The ballast 22 can be, for example, a MOTOROLA® T5 electromagnetic ballast. The T5 bulbs preferably comprise OSRAM SYLVANIA® T5 85CRI. In this embodiment, the unit acts as both the reflector and as a mount for the ballast and the bulbs. Thus, UL requirements mandate the unit 20 be formed of a metal material having a minimum thickness of 0.032. One feature of the present invention is the ability for the retrofit unit 20 to be simply placed inside the existing fixture over the existing structures without having to modify the existing fixture.

Sockets 28 are preferably of the T5 miniature bi-pin type, to permit the retrofit unit to house T5 fluorescent bulbs. Accordingly, it is preferred that the length of the reflector 26 is formed to match the length of the T5 bulb, of course, taking into account the dimensions of the sockets 28. Ballast 22 includes power feed lines 24 and power output lines 32. Power feed lines connect to conventional AC current (e.g., 120V or 277V power systems) and output lines supply power to sockets 28. Since the length of the unit 20 is approximately 2 inches less than the length of a corresponding T8 or T12 fixture, the present invention can simply be placed over the existing hardware of a conventional fixture, without modification. To this end, a trough 34 is provided that is large enough to permit the unit 20 to cover the existing ballast, without obstruction. To accomplish this, a technician need only disconnect the power lines to the old ballast, and reattach the power lines to the ballast 22 provided herein. Thus, the old ballast can remain in place, thereby eliminating the need for costly waste disposal. In addition since the unit 20 is approximately two inches shorter than conventional fixtures, the unit will readily fit between the sockets of a T12, and over the old ballast, thereby eliminating the need for cumbersome and costly socket adapters, and providing a relatively inexpensive means to retrofit a conventional lighting fixture. To that end, and not shown in the drawings, anchors, screws or other affixing means can be supplied to connect the unit 20 to the housing 16, the unit can rest on the door trim holding the lens or louver.

The unit 20 is generally semicircular in shape, local to each bulb location, as shown. Thus, in the embodiment shown in Figure 2, the unit has two parabolic

indents 30 to house each lamp. Each parabolic indent surrounds each bulb sufficiently to direct upwardly and horizontally extending light beams in a downward fashion. Additionally, the reflector of the first embodiment includes a plurality 26 of longitudinally extending reflecting surfaces arranged at angles, Θ_1, Θ_2, Θ_3, Θ_4, etc., with respect to a horizontal plane 80, so that light is optimally guided in a downward direction.

Figures 3A-3C, 4 and 5 depict the light retrofit unit 50 of the second embodiment of the present invention. In this embodiment, a two-piece retrofit unit is provided including a reflector piece 52 and a center piece 54. In this embodiment, the reflector is installed first, around the existing ballast 18, by attaching the reflector to the troffer body 60 of the existing light unit, via connection means 58. The connection means can include screws, nails, or the like, and preferably includes self-tapping tech screws. A top down view of the reflector is shown in Figure 5. The reflector preferably includes openings 62, 64 formed in the center which are dimensioned to allow the existing ballast 18 to fit therethrough. Connection holes 64 are provided to affix the reflector 52 to the troffer body 60, via connection screws 58. The dashed lines in Figure 5 indicate relief areas of differing height of the longitudinal reflection surfaces 68 shown in Figures 3A-3C. Also preferably, the reflector 52 includes snap slots 70 to permit the centerpiece to snap into the reflector, upon complete installation.

The centerpiece 54, shown in Figures 3B, 3C and 4, preferably includes a ballast 22', wires 24' and sockets 28' for T5 bulbs, similar to the first embodiment. Additionally, snap pins 74 are provided to snap into the slots 70 of the reflector. A safety chain is also preferably included to hold the centerpiece 54 during installation thereof, and to ensure that the power cables 24' are not forced to support the weight of the centerpiece in the event the centerpiece and reflector disengage.

Installation of the retrofit unit of this embodiment is best shown in Figures 3A-3C. First, the existing bulbs are removed. The reflector 52 is installed around the existing ballast(s) 18, as shown in Figure 3A. Power is disconnected from the ballast. The safety chain 76 of the centerpiece is attached to the reflector and the power lines 24' are connected to the new ballast 22'. The centerpiece 54 is affixed to the reflector 52 using the mated slot 70 pin 74 arrangement, described above. Unlike the previous

embodiment, since the reflector 52 does not directly support any hardware mounting, it can, and is preferably formed of a lighter gauge metal than the first embodiment, i.e., less than 0.032" thick.

Similar to the first embodiment, the reflector piece 52 preferably includes a plurality of longitudinally disposed reflecting surfaces 68, each arranged at an angle, Θ_1', ..., Θ_4', with respect to the horizontal plane 80. These angles direct light in a downward fashion, as shown in Figure 3C. The angles of the reflecting surfaces 26 and 68 of both embodiment herein described are determined by the position of the bulb and the overall profile of the reflector. Of course, each embodiment can be adapted with more or fewer reflecting surfaces, depending on a desired efficiency of light reflectivity.

Thus, it is evident that there has been provided a light fixture retrofit system that permits a user to inexpensively retrofit existing fixture technology with more efficient lighting systems. Modifications to the present invention are possible. For example, the unit 20 can be appropriately dimensioned to fit into standard 2x2, 1x4 or 2x4 light fixture, or may be specially dimensioned for a particular area. In addition, although Figure 2 depicts a two-bulb embodiment, those skilled in the art will recognize that the present invention can be appropriately adapted for any number of bulbs or different fixture types.

CLAIMS

1. A one-piece light fixture retrofit unit to retrofit a fluorescent light fixture having T12 bulbs with T5 bulbs, comprising a reflecting unit having a plurality of T5 sockets disposed at either end and a ballast for supplying power to said sockets, said reflector having a parabolic profile partially surrounding a light bulb and a plurality of reflecting surfaces longitudinally disposed along the length of said reflector, each surface have a predetermined angle with respect to a horizontal plane for reflecting light from said bulb in a downward direction.

2. A unit as claimed in claim 1, wherein said reflecting unit having a cross sectional profile of two parabolic shapes, one for each bulb, wherein the trough formed between said parabolic shapes being adapted to cover an existing ballast of said fluorescent light fixture.

3. A unit as claimed in claim 1, wherein said reflector being formed of aluminum and having a minimum thickness of 0.032".

4. A two-piece light fixture retrofit unit to retrofit a fluorescent light fixture having T12 bulbs with T5 bulbs, comprising a reflector having a parabolic profile partially surrounding a light bulb and a plurality of reflecting surfaces longitudinally disposed along the length of said reflector, each surface have a predetermined angle with respect to a horizontal plane for reflecting light from said bulb in a downward direction, and a centerpiece removably affixed to said reflector, said centerpiece comprising a plurality of T5 sockets disposed at either end and a ballast for supplying power to said sockets.

5. A unit as claimed in claim 4, wherein said reflector having openings formed therein to permit an existing ballast of said fluorescent light fixture to pass therethrough.

6. A unit as claimed in claim 4, further comprising attachment means to attach said reflector to the body of said fluorescent light fixture.

7. A unit as claimed in claim 4, wherein said reflector being formed of aluminum and having a thickness of less than 0.032".

8. A method of retrofitting an existing fluorescent light fixture with T5 bulbs, said method comprising the steps of:

removing the existing bulbs from said light fixture;

disconnecting power from an existing power ballast of said existing light fixture;

installing a retrofit unit having T5 sockets and a power ballast for T5 bulbs between the sockets of said existing bulbs;

coupling power to the new ballast of said retrofit unit;

affixing said retrofit unit to a housing of said existing fluorescent light fixture.

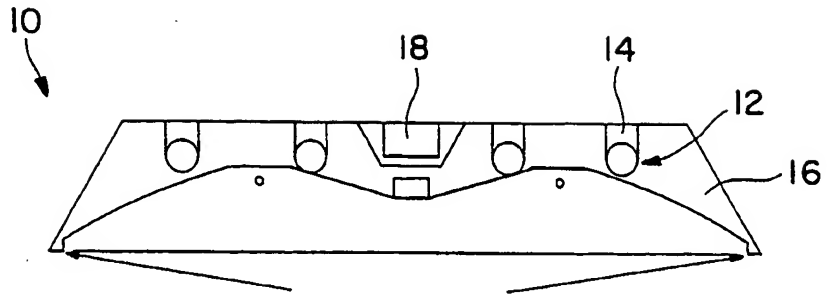

FIG. 1
PRIOR ART

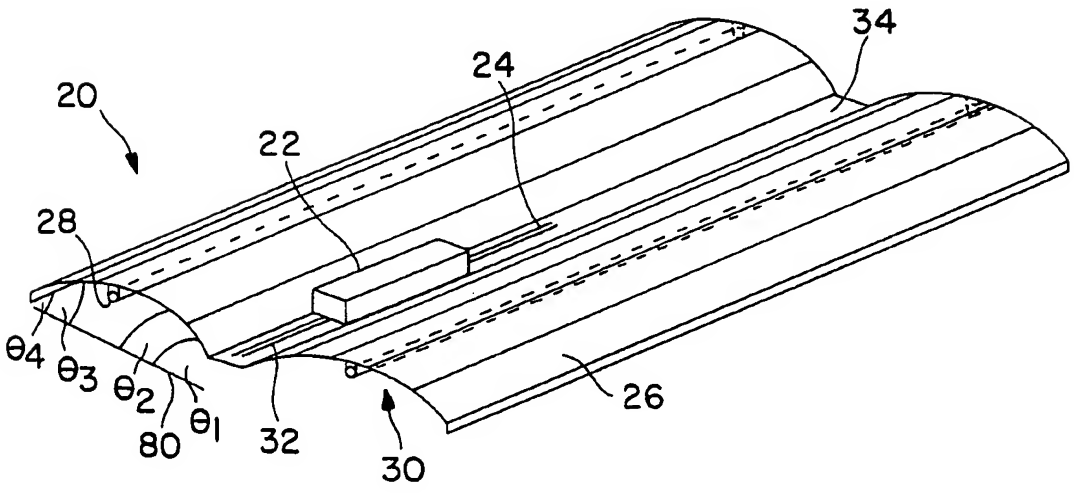

FIG. 2

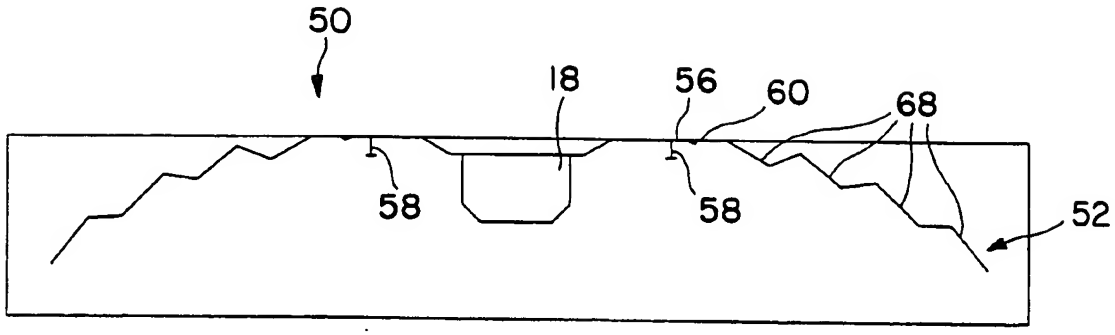

FIG. 3A

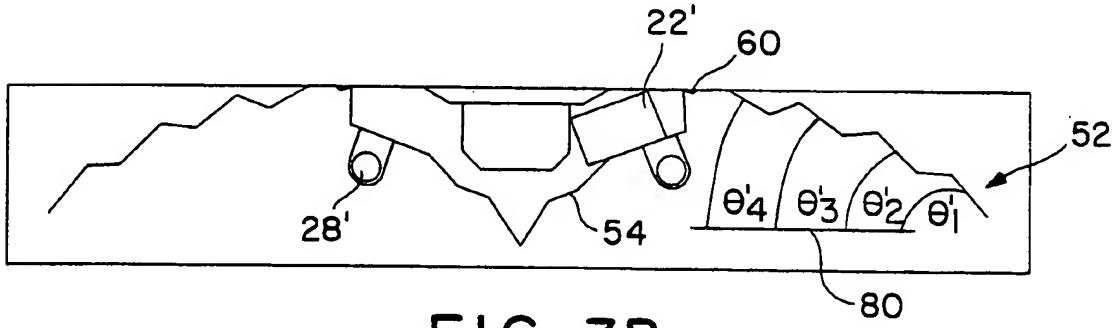

FIG. 3B

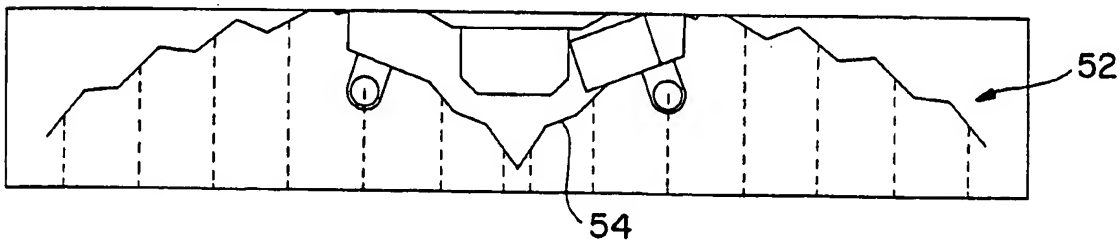

FIG. 3C

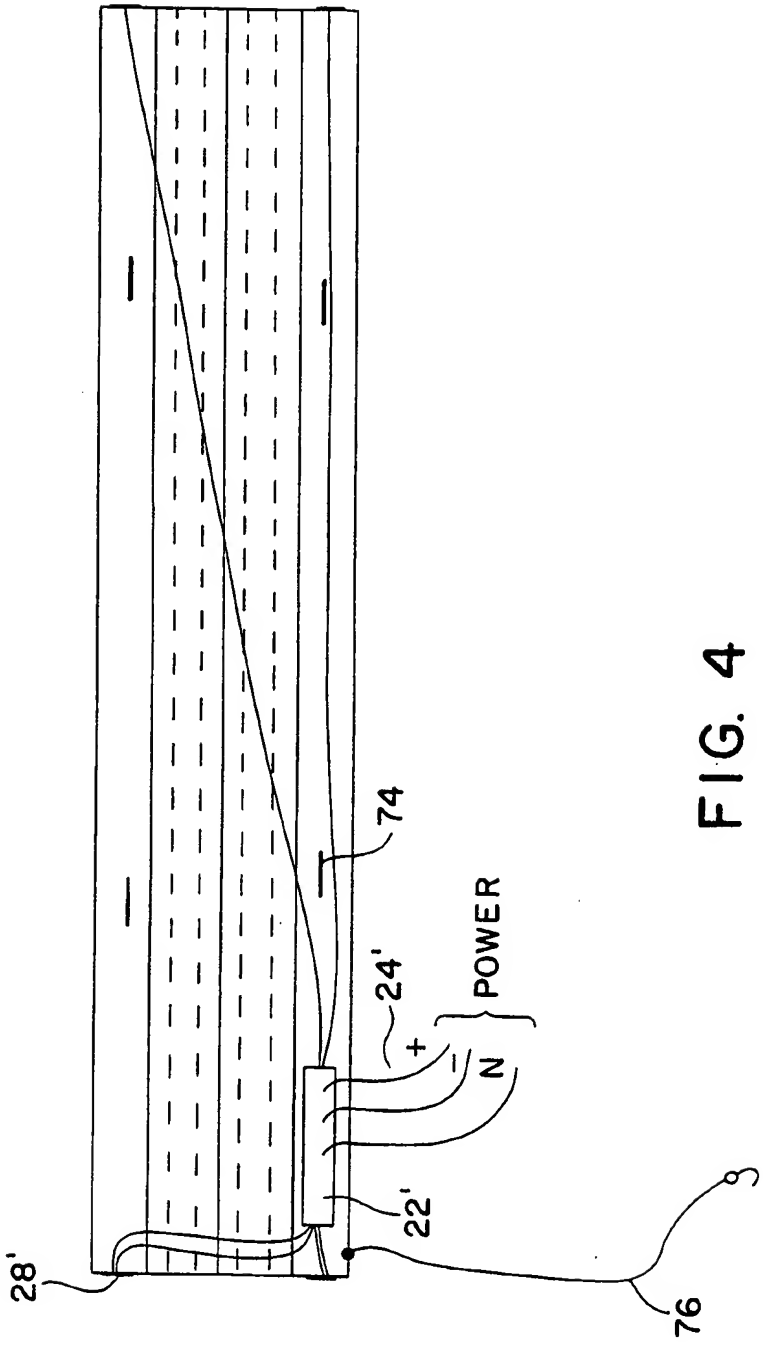

FIG. 4

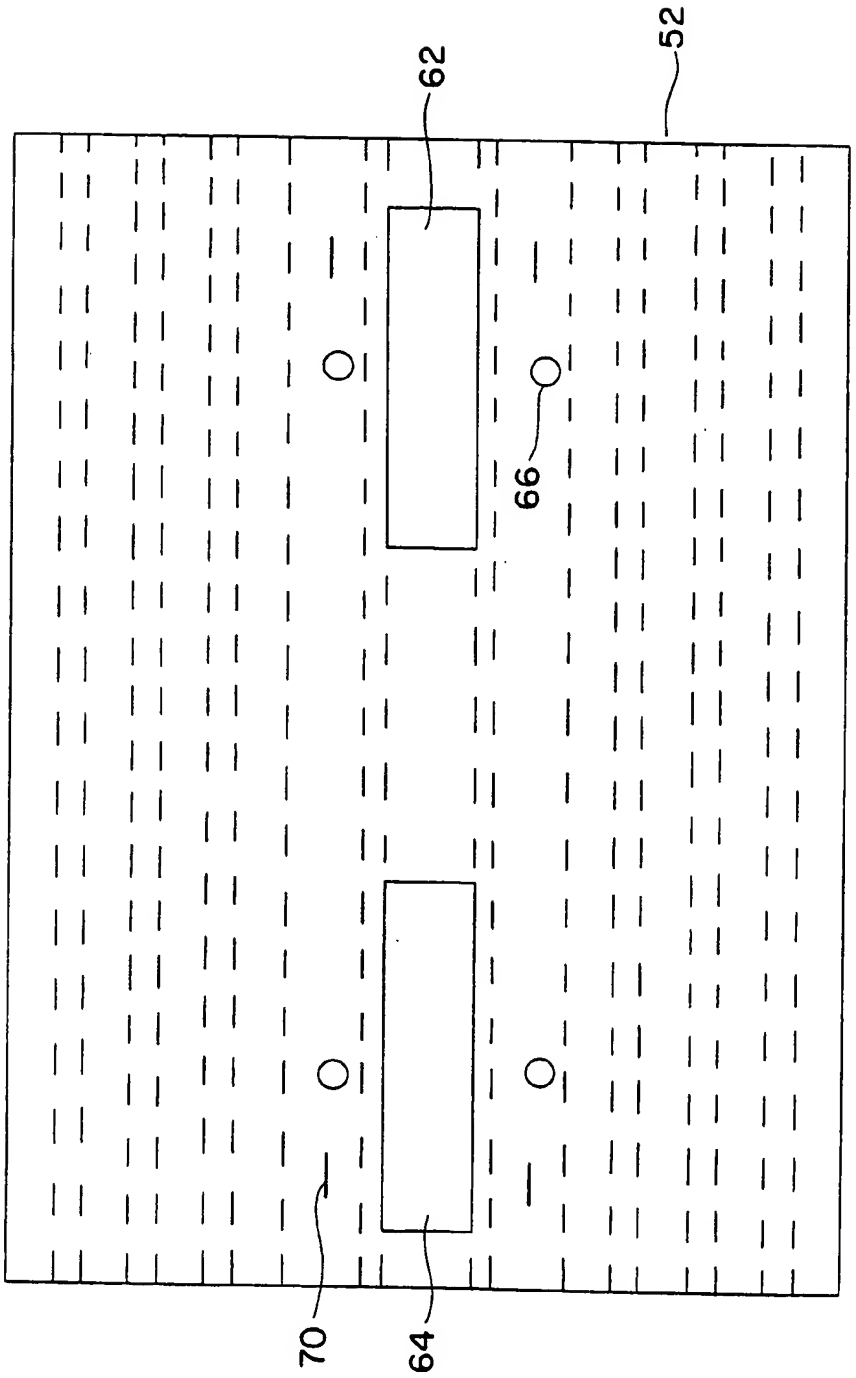

FIG. 5